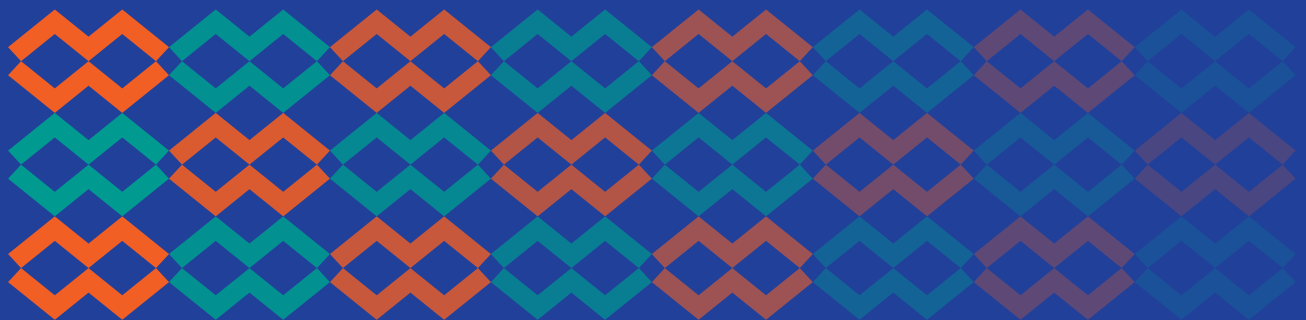


TECHNICAL PAPER

The Schooling –Learning Rift in Kaduna State

Diagnosing girls' foundational learning poverty
across the State's 23 Local Government Areas.



PREPARED BY

**Bahogo Mission · Gideon Olanrewaju ·
Praise Adebisi**

SUPPORTING AUTHORS

with Grace Yusuf, Samuel Yusuf, Oluwabusolami Yakubu

Evidence from
Practice Series
2026

Contents

SECTION 01

Introduction

SECTION 02

Conceptual & Theoretical Framework

SECTION 03

Literature Review

SECTION 04

Data & Methodology

SECTION 05

Empirical Findings

SECTION 06

Discussion

SECTION 07

Policy Implications & Programmatic Response

SECTION 08

Limitations & Robustness

SECTION 09

Conclusion & References

Executive Summary

Nigeria has made important progress in expanding access to schooling, but access has not consistently translated into foundational learning. This paper examines that divergence for girls across all 23 Local Government Areas of Kaduna State. It defines the **schooling-learning rift** as the structural gap between girls’ participation in schooling and their acquisition of minimum foundational literacy and numeracy skills.

The study combines four administrative datasets at LGA level (N = 23): the Learning Poverty Report (2023), the Annual School Census (2024/25), the Out-of-School Children Mapping (2023) and the Statistical Yearbook (2024). It applies Bronfenbrenner’s Social-Ecological Systems framework to organise the explanatory factors and constructs a **Schooling-Learning Rift Index (SLRI)** that compares access-related performance with learning poverty. The analysis uses descriptive statistics, Pearson correlations and a parsimonious beta regression with a logit link, estimated with HC3 robust standard errors.

The findings show a severe and highly uneven learning crisis. Female out-of-school rates, pupil-teacher ratios and the share of schools without a health facility are statistically significant predictors of Female LPI. The strongest bivariate correlate is female OOSC (r = +0.616), followed by pupil-teacher ratio (r = +0.437). The average marginal effect for female OOSC is +0.51 percentage points in LPI per one-percentage-point increase in the OOSC rate; for pupil-teacher ratio and absence of a health facility the corresponding effects are +0.38 and +0.22 percentage points.

THE CENTRAL FINDING

Access and learning can diverge sharply inside the same state. Sabon Gari records a Gender Parity Index of 1.04 alongside 96.7% Female Learning Poverty. Parity in enrolment is an insufficient proxy for equity in outcomes.



72.3%

Average female learning Poverty

11

LGAs classified as High Rift — nearly half the state.

7.2% -97.5%

Range of Female LPI across the 23 LGAs

The policy implication is that Kaduna should move from uniform state-level interventions towards differentiated LGA level responses. The evidence supports five linked priorities: targeted teacher deployment and retention; WASH and health infrastructure in high-rift areas; structured literacy and numeracy pedagogy; targeted OOSC re-enrolment and retention; and institutionalised annual LGA-level learning assessment.

SECTION 01

The Global Learning Problem

Global progress in expanding school access has not been matched by equivalent progress in learning. The World Bank and related global evidence describe a persistent learning crisis in which large numbers of children reach the later primary grades without acquiring basic reading and numeracy skills. This is particularly consequential for girls in low and middle-income contexts, where educational trajectories are shaped by overlapping economic, social, safety and infrastructure constraints.

The distinction between schooling and learning is therefore fundamental. Enrolment indicates participation in an education system; it does not, by itself, establish whether the system is producing the knowledge and competencies that children need. For girls the distinction matters especially, because barriers to attendance can accumulate with poor instructional quality, producing deficits that grow harder to reverse as children move through sequential learning systems.

27%

of children aged 7–14 with foundational reading skills, nationally

4%

in the poorest wealth quintile, against 66% in the richest

1.00

average Gender Parity Index across Kaduna's 23 LGAs

Nigeria illustrates the divergence sharply. UNICEF's MICS-EAGLE analysis reports that only 27% of children aged 7–14 had foundational reading skills and 25% had foundational numeracy skills in 2021. The distribution is highly unequal: the 2024 Situation Analysis reports foundational reading skills among 66% of children in the richest wealth quintile against 4% in the poorest. These figures establish a national context in which increasing school participation cannot be treated as equivalent to learning success. Evidence from northern Nigeria also points to persistent structural constraints. Research in Kaduna and Bauchi identifies low learning outcomes across public, private and informal schooling sectors, and recent work on North-West Nigeria highlights a gap between practical numeracy and the formal mathematics acquired in school.

Kaduna provides an important sub-national case because progress in gender parity in enrolment coexists with large differences in learning outcomes between LGAs. The GPI is at or close to 1.0 in most LGAs, indicating that the numerical gap in enrolment between boys and girls has narrowed substantially. Yet Female LPI remains very high in many of the same locations. That divergence is the problem this paper terms the schooling–learning rift.

The rift is not uniform. Some LGAs combine high learning poverty with high female OOSC rates and severe teacher or infrastructure constraints. Others have achieved relatively strong access and comparatively stronger learning. This within-state variation matters operationally, because state averages conceal the specific bottleneck an LGA faces.

THE POLICY PROBLEM

An education authority that answers a high-access, high-learning-poverty LGA with further enrolment expansion may fail to address the binding constraint entirely.

Four questions the study sets out to answer.

01 · MAGNITUDE

Spatial distribution

What is the magnitude and spatial distribution of girls' schooling–learning rift across Kaduna State's 23 LGAs?

02 · ASSOCIATION

Structural correlates

To what extent are girls' school participation, teacher supply and school-quality indicators associated with learning poverty?

03 · STRUCTURE

Conditional importance

Which structural factors are most strongly associated with Female LPI after accounting for the other variables in the model?

04 · TRANSLATION

Operational response

How can the resulting LGA-level evidence be translated into differentiated, sequenced policy responses?

THE RESEARCH GAP

Existing research on girls' education in Northern Nigeria has often examined individual barriers; poverty, household labour, infrastructure, cultural norms or school supply, separately. Less attention has been given to the interaction of these factors in producing a measurable divergence between access and learning at sub-state level. Few analyses distinguish an LGA where girls are **not entering school** from one where girls are **entering but not learning**, even though each implies a different response.

Three contributions

01 An LGA-disaggregated, multi-source analysis

Girls' learning poverty measured across all 23 of Kaduna's LGAs, using four merged administrative datasets.

02 A low-cost diagnostic instrument

The SLRI compares access performance with learning performance, exposing where the two have come apart.

03 A route from diagnosis to policy

The diagnostic is connected to an empirical model of structural correlates and to a differentiated, sequenced policy package.

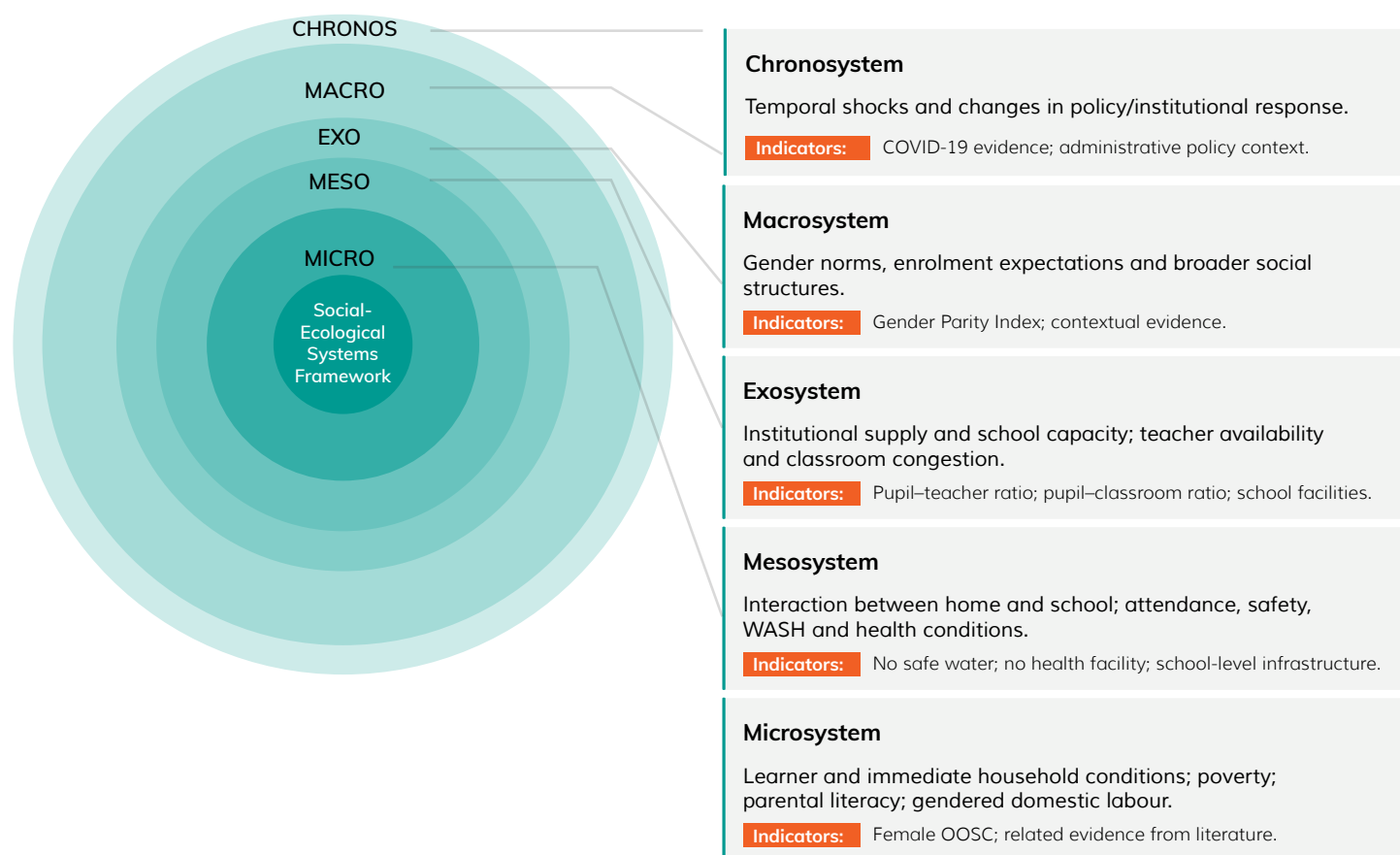
The remainder of the paper is organised as follows. Section 2 presents the conceptual and theoretical framework, with particular attention to the Social-Ecological Systems framework and the schooling–learning rift. Section 3 reviews relevant literature. Section 4 describes the study area, data sources, variables, construction of the SLRI and the empirical strategy. Section 5 presents the descriptive, index-based, correlation and regression findings. Section 6 discusses those findings against theory and existing evidence. Section 7 considers policy and programmatic implications. Section 8 sets out limitations and robustness considerations. Section 9 concludes.

SECTION 02

Conceptualising the Schooling–Learning Rift

The schooling–learning rift is defined as the structural divergence between participation in schooling and acquisition of foundational literacy and numeracy. The concept separates four stages of the education production process: access to school, regular participation, exposure to adequate instruction, and acquisition of learning. A system may improve at one stage without improving equally at the next. The SLRI operationalises this problem by comparing learning poverty with indicators of access and participation at LGA level.

This matters because learning poverty can be produced by different combinations of exclusion and quality. A girl who has never entered school faces an access constraint; a girl who attends regularly but cannot read a simple sentence faces a quality constraint; an LGA with both high OOSC and high LPI faces a compounded constraint. The analytical task is to identify which combination characterises each locality.



The paper treats access as necessary but insufficient. High GPI should not automatically be read as high educational equity if learning outcomes remain poor; conversely, a lower GPI may reflect an access deficit that should be addressed directly rather than read as a quality problem. The central proposition is that the rift is produced by interacting structural forces. Teacher deployment can address institutional supply, but cannot by itself resolve exclusion or infrastructure constraints. Community mobilisation can increase participation, but cannot substitute for effective classroom instruction. Infrastructure investment can improve learning conditions, but may have limited effect where instructional quality remains weak. The empirical strategy therefore tests institutional and access-related correlates simultaneously rather than treating any single factor as a complete explanation.

SECTION 03

The Global and National Learning Crisis

The global learning crisis is increasingly understood as a failure of education systems to convert attendance into foundational skills. World Bank learning-poverty work and UNESCO reporting emphasise that many children remain in school while failing to acquire basic competencies. The policy significance is that school expansion without learning improvement can generate a misleading appearance of progress.

Nigeria's evidence is consistent with this pattern. The MICS-EAGLE foundational learning module shows low national levels of reading and numeracy proficiency among 7–14-year-olds, with steep inequalities by wealth and residence. The 2024 national Situation Analysis similarly reports that only 27% of children in this age group have core reading skills and 25% have core numeracy skills. These data support the paper's focus on learning rather than enrolment as the primary outcome.

Poverty operates through both direct and indirect pathways. It can constrain enrolment through costs and transport, while also increasing children's exposure to domestic labour and other demands on time. Abdu et al. (2020) document substantial participation of enrolled girls in domestic child labour in Northern Nigeria. Such demands matter for learning because foundational skills are sequential and cumulative: repeated absence or limited cognitive engagement can create deficits that later instruction may struggle to compensate for. Azubuike et al. (2024) identify state and wealth inequalities in foundational literacy and numeracy, indicating that children with similar individual characteristics can face different learning environments because of the resources and conditions of the communities in which they live.

Girls face additional constraints linked to early marriage, gender-based violence, harassment, domestic responsibilities and inadequate gender-responsive infrastructure. Moliki-Salman and Kopczak-Wirga (2023) situate gender-based violence within the wider educational environment in Northern Nigeria, while UNICEF's work on WASH and girls' education highlights how inadequate facilities can undermine attendance, dignity and continuity. These mechanisms are important because they link infrastructure to learning indirectly, through attendance and participation.

THE QUESTION THE LITERATURE LEAVES OPEN

Girls' learning disadvantage is well established as multi-causal. What the literature provides less guidance on is how to distinguish the type and intensity of constraint across localities within a single state.

Do enrolment and learning move together?

Evidence from Kaduna and Bauchi suggests that most children are enrolled in some form of education but that learning outcomes remain below expected levels across sectors (Dogar, Shakeel & Tooley, 2025). This supports the distinction made here between an access gap and a learning-quality gap. The North-West Nigerian evidence on formal versus informal numeracy adds an important qualification. Weber, Bogler and Vollmer (2024) find that children can demonstrate practical mathematical reasoning in market-like contexts that is not reflected in formal school mathematics. The problem is therefore not simply an absence of cognitive capacity; instructional approaches may fail to connect existing competencies with formal learning. Learning poverty should be interpreted as a system-level outcome, not as evidence of low learner motivation.

Institutional supply and infrastructure

Teacher availability and classroom congestion are plausible institutional determinants. Adeniran et al. (2025) characterise Nigeria's education system as a low-achieving equilibrium in which instructional alignment, infrastructure and curriculum conditions can reinforce low levels of cognitive engagement. The present study tests pupil–teacher and pupil–classroom ratios as observable proxies for this institutional capacity. Infrastructure can affect learning through several pathways: lack of water, sanitation and health facilities can increase absenteeism, particularly for girls, while overcrowding and poor classroom conditions can reduce instructional quality. Because infrastructure indicators may be relatively uniform across LGAs, their bivariate association with learning can appear weaker than expected even when their conditional relationship is meaningful.

Kaduna-specific and North-West evidence reinforces the need for sub-state analysis. UNICEF-supported interventions in Northern Nigeria have combined enrolment, community engagement, infrastructure and structured pedagogy. The Learning Lab model, implemented in 12 schools across Borno, Kaduna and Lagos during 2022–2023, shifted teacher professional development away from cascade training towards school-based support, instructional leadership, mentoring and cycles of inquiry. These initiatives demonstrate the value of combining access and quality interventions rather than treating them as mutually exclusive.

WHAT THE LITERATURE DOES NOT YET DO

It establishes that girls' learning disadvantage is multi-causal. It provides less guidance on how to distinguish the type and intensity of constraint across localities within a state.

This paper addresses that gap by measuring access and learning jointly at LGA level, constructing an explicit rift index and testing structural predictors, a diagnostic purpose rather than a causal one.

SECTION 04

Four administrative datasets, merged at LGA level.

The study uses a cross-sectional, LGA-level observational design. The unit of analysis is the Local Government Area, and all 23 LGAs in Kaduna State are included. Four administrative datasets are merged to create a common analytical file. The design is appropriate for state-level diagnostic targeting because the principal policy decisions considered here, teacher deployment, infrastructure allocation, structured pedagogy and monitoring are implemented through administrative and geographic structures that include LGAs. The design does not support individual-level or causal inference.

DESIGN

Cross-sectional, LGA-level observational

Unit of analysis: the LGA · N = 23 ·
All LGAs in Kaduna State included

2023 Kaduna State Learning Poverty Report Primary learning outcome. Female LPI; English, Hausa and numeracy proficiency.	2024/25 Annual School Census Institutional predictors. Staffing, pupil-teacher and pupil-classroom ratios, infrastructure.	2023 Out-of-School Children Mapping Access / exclusion predictor. Female OOSC rate.	2024 Kaduna Statistical Yearbook Access & parity indicators. Enrolment denominators; Gender Parity Index.
---	---	--	--

ANALYTICAL STRATEGY



Variables

Female LPI	Dependent variable, share of enrolled Primary 6 girls scoring below the Minimum Proficiency Level in foundational literacy and numeracy. Higher values indicate greater learning poverty.
Female OOSC (%)	Share of school-age girls out of school, representing exclusion and disrupted learning exposure.
Pupil-Teacher Ratio	Pupils per teacher, an indicator of instructional congestion and teacher availability.
Pupil-Classroom Ratio	Pupils per classroom, representing physical congestion.
No Safe Water (%)	Share of schools without safe water facilities.
No Health Facility (%)	Share of schools without a health facility.
No Functional Blackboard (%)	Share of schools without a functional blackboard.
Gender Parity Index	Female-to-male enrolment ratio, used as an access and gender-parity indicator.

METHODOLOGICAL BOUNDARIES

Cross-sectional design cannot establish causal order · LGA aggregation masks within-LGA variation · N = 23 constrains model complexity. Read the estimates as structural associations, not intervention effects.

SECTION 4.1 - THE DIAGNOSTIC

Construction of the Schooling–Learning Rift Index

The SLRI is designed to quantify whether an LGA's learning poverty is better or worse than would be suggested by its access indicators. It is calculated as:

SCHOOLING–LEARNING RIFT INDEX

$$\text{SLRI} = \frac{z(\text{Female LPI}) - [z(\text{GPI}) + z(1 - \text{Female OOSC } \%)]}{2}$$

where $z(\cdot)$ denotes standardisation across the 23 LGAs.

SLRI > +0.75

High Rift

Learning poverty is substantially worse than access indicators would suggest.

11 of 23 LGAs

−0.25 to +0.75

Moderate Rift

Learning and access conditions are more closely aligned, or moderately divergent.

3 of 23 LGAs

SLRI < −0.25

Low Rift

Learning outcomes are relatively better than access indicators would predict.

9 of 23 LGAs

A positive SLRI means learning poverty is worse than the LGA's access profile predicts; a negative value means learning is relatively better than access conditions alone would suggest. The thresholds are diagnostic groupings, not externally validated causal cut-offs, sensitivity to alternative weights should be tested before institutionalisation.

Estimation

The descriptive analysis examines means, standard deviations, ranges and LGA-level distributions. Pearson correlations describe linear associations between Female LPI and the structural predictors. Because the dataset contains only 23 observations, correlations are treated as descriptive evidence rather than causal estimates and are interpreted alongside the multivariate model.

Because Female LPI is a proportion bounded between 0 and 1, ordinary least squares was not used. The implementation uses the R `betareg` package with a logit link and a Smithson–Verkuilen transformation for boundary values. For technical consistency this paper refers to the model as a beta regression with logit link rather than “Fractional Logit (betareg)”. A true fractional-logit model is normally estimated as a quasi-likelihood or generalised linear model rather than with `betareg`. This terminology change does not alter the reported estimates; it clarifies what the stated implementation represents.

Given $N = 23$, model complexity is constrained by the risk of overfitting. The original analysis compared a full five predictor specification with a parsimonious three-predictor model. The parsimonious model PTR, absence of a health facility and female OOSC was preferred on theoretical grounds and by AIC (−28.4 versus −24.1). HC3 robust standard errors address small-sample heteroskedasticity, and average marginal effects were estimated using `marginalEffects::avg_slopes()`.

SECTION 05

The dispersion is the finding.

State averages conceal local realities; pupil–teacher ratio alone varies more than fivefold.

Variable	Mean	SD	Min	Max
Female Learning Poverty (%)	72.3	22.0	7.2	97.5
English below MPL (%)	65.0	24.3	3.7	95.2
Hausa below MPL (%)	77.6	20.6	18.2	95.0
Numeracy below MPL (%)	28.1	18.3	0.0	71.1
Female OOSC (%)	25.0	17.0	1.1	51.9
Pupil–Teacher Ratio	80.3	38.2	30	162
Pupil–Classroom Ratio	95.6	42.2	44	197
No Safe Water (%)	62.9	15.4	34	92
No Health Facility (%)	61.2	25.8	12	95
No Functional Blackboard (%)	59.3	11.4	38	76
Gender Parity Index	1.00	0.10	0.8	1.1

TABLE 1 · DESCRIPTIVE STATISTICS · N = 23

The average Female LPI of 72.3% indicates that nearly three-quarters of enrolled girls are below the minimum proficiency threshold used in the underlying assessment. Hausa literacy deficits (77.6%) exceed English deficits (65.0%), while numeracy deficits are lower but remain substantial. PTR varies more than fivefold. High learning poverty occurs at **both ends** of the PTR distribution, indicating that teacher availability matters but does not explain the full pattern.

A spread between 7.2% and 97.5% is large enough to demonstrate that Kaduna cannot be treated as a single learning environment.

HIGHEST FEMALE LEARNING POVERTY

Kauru	97.5%
Sabon Gari	96.7%
Makarfi	93.0%
Ikara	92.2%
Zaria	88.5%

LOWEST FEMALE LEARNING POVERTY

Jema'a	7.2%
Kaura	38.2%
Jaba	41.8%
Chikun	54.1%
Birnin Gwari	55.4%

5.4×

variation in pupil–teacher ratio, from 30 in Kaduna South to 162 in Giwa

22.0

standard deviation of Female LPI across the 23 LGAs

1.00

state-average Gender Parity Index, the number that hides all of this

SECTION 5.1 - THE DISTRIBUTION

Every LGA, by learning poverty.

FEMALE LEARNING POVERTY INDEX BY LGA · % OF ENROLLED P6 GIRLS BELOW MPL

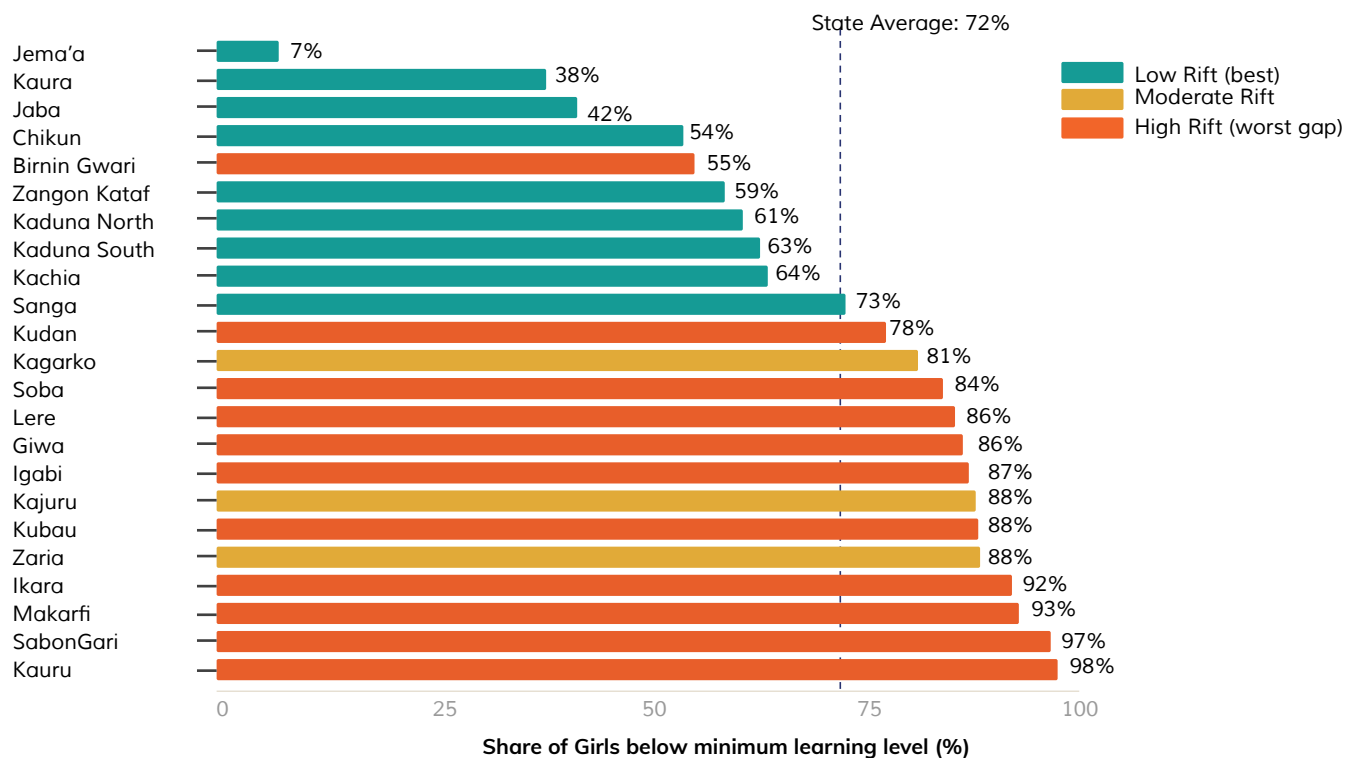


Figure 1. Female Learning Poverty by LGA, sorted from lowest to highest, with the state average marked. Bar colour shows the LGA's Schooling Learning Rift classification.

Eleven LGAs are classified as High Rift, three as Moderate Rift and nine as Low Rift. The SLRI distribution shows that learning poverty is not simply a mirror of access performance: an LGA can record mid-range learning poverty and still sit at the top of the ranking when its access indicators are comparatively strong. That divergence is what the index is built to expose.

SECTION 5.2 - THE FULL RANKING

Distribution of Female Learning Poverty

The five LGAs with the highest Female LPI are Kauru (97.5%), Sabon Gari (96.7%), Makarfi (93.0%), Ikara (92.2%) and Zaria (88.5%). The five with the lowest are Jema'a (7.2%), Kaura (38.2%), Jaba (41.8%), Chikun (54.1%) and Birnin Gwari (55.4%). The spread between 7.2% and 97.5% is large enough to demonstrate that Kaduna cannot be treated as a single learning environment.

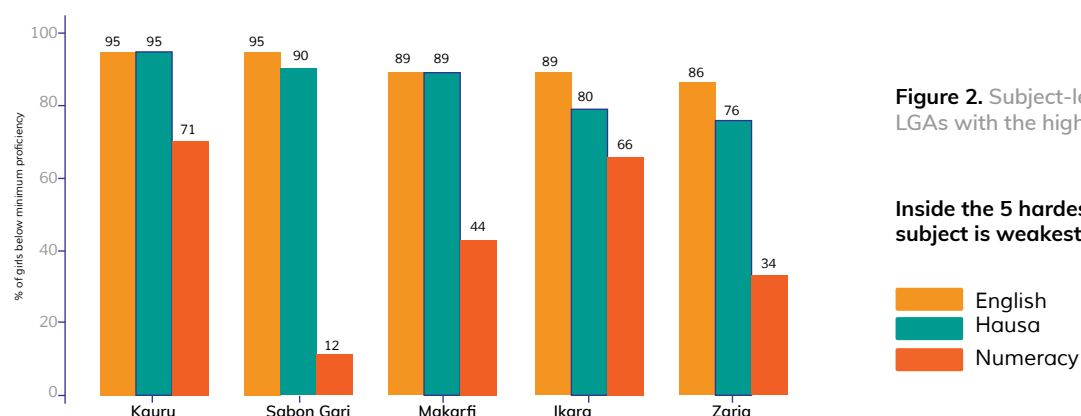


Figure 2. Subject-level breakdown for the five LGAs with the highest overall learning poverty.

Inside the 5 hardest-hit LGAs: which subject is weakest?

English
Hausa
Numeracy

SECTION 5.3

The Schooling–Learning Rift Index

Eleven LGAs are classified as High Rift, three as Moderate Rift and nine as Low Rift. The SLRI distribution shows that learning poverty is not simply a mirror of access performance.

Rank	LGA	LPI (%)	OOSC (%)	GPI	PTR	SLRI	Class
1	Kauru	97.5	51.9	0.96	79	2.16	High Rift
2	Soba	84.2	48.3	0.92	93	1.80	High Rift
3	Birnin Gwari	55.4	49.7	0.81	149	1.50	High Rift
4	Makarfi	93.0	36.1	0.97	98	1.41	High Rift
5	Giwa	86.5	28.9	0.92	162	1.34	High Rift
6	Igabi	87.2	40.3	0.97	133	1.27	High Rift
7	Kubau	88.3	50.4	1.01	139	1.26	High Rift
8	Ikara	92.2	31.9	0.97	132	1.25	High Rift
9	Kudan	77.6	32.6	0.92	89	1.04	High Rift
10	Sabon Gari	96.7	32.1	1.04	58	0.84	High Rift
11	Lere	85.6	40.5	1.02	75	0.76	High Rift
12	Zaria	88.5	14.8	0.96	72	0.66	Moderate Rift
13	Kajuru	88.0	15.8	0.99	39	0.41	Moderate Rift
14	Kagarko	81.3	25.2	1.01	79	0.20	Moderate Rift
15	Kaduna North	61.0	25.4	0.99	39	-0.54	Low Rift
16	Kaduna South	63.0	24.9	1.00	30	-0.55	Low Rift
17	Sanga	72.9	2.5	1.00	49	-0.76	Low Rift
18	Kachia	63.9	5.6	0.99	79	-0.99	Low Rift
19	Zangon Kataf	58.9	1.8	1.00	54	-1.42	Low Rift
20	Chikun	54.1	5.1	1.06	63	-2.07	Low Rift
21	Jaba	41.8	6.8	1.04	63	-2.40	Low Rift
22	Kaura	38.2	1.1	1.10	39	-3.26	Low Rift
23	Jema'a	7.2	3.6	1.02	34	-3.90	Low Rift

The 'Rift Score': where's the gap between girls being IN School and girls LEARNING widest?

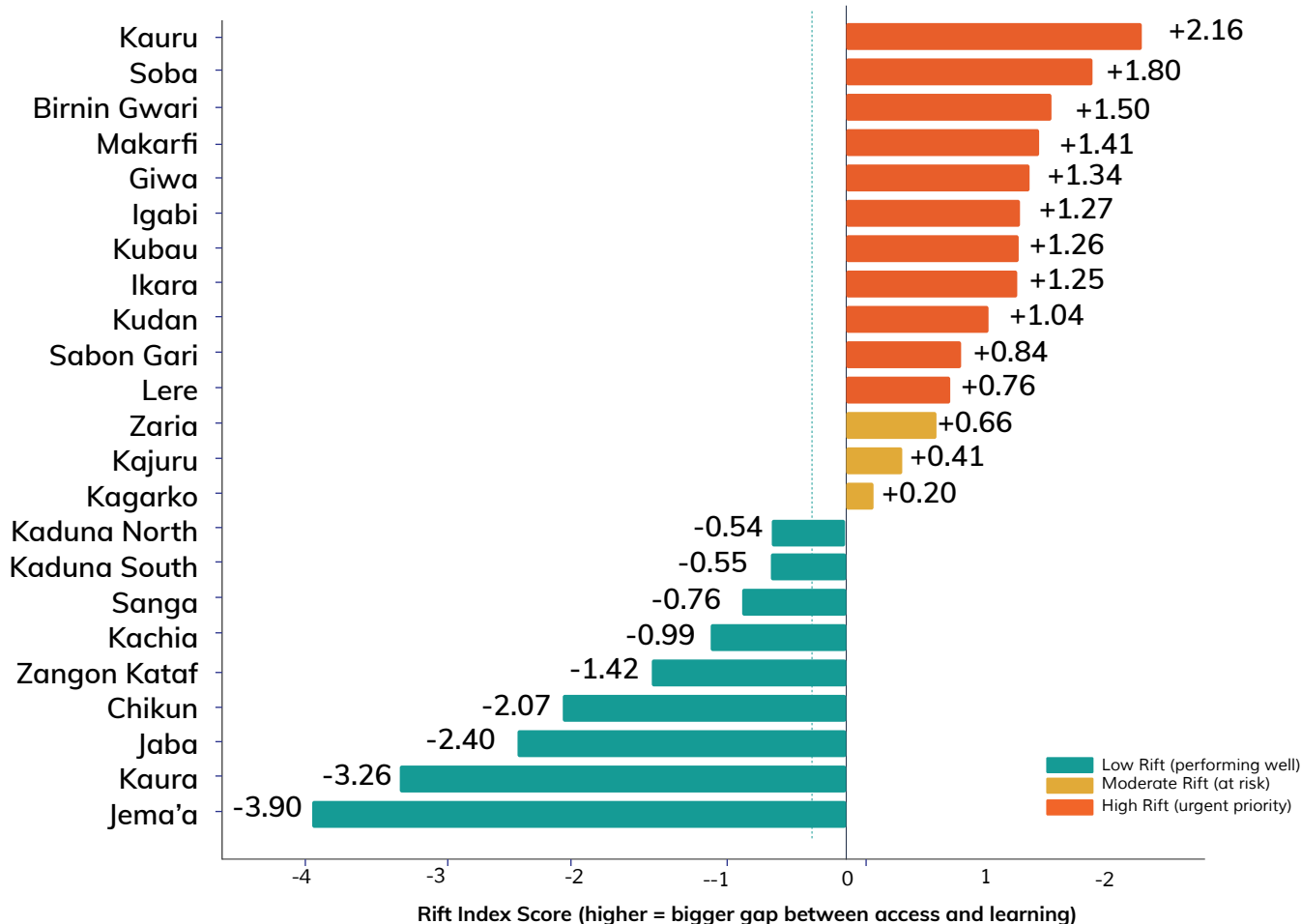


Figure 3: Schooling-Learning Rift Index (SLRI) by LGA; higher positive values indicate a larger rift.

The 'Rift Map': Are girls IN school and are they LEARNING? Top-right + girls attend school in equal numbers, but most are not learning

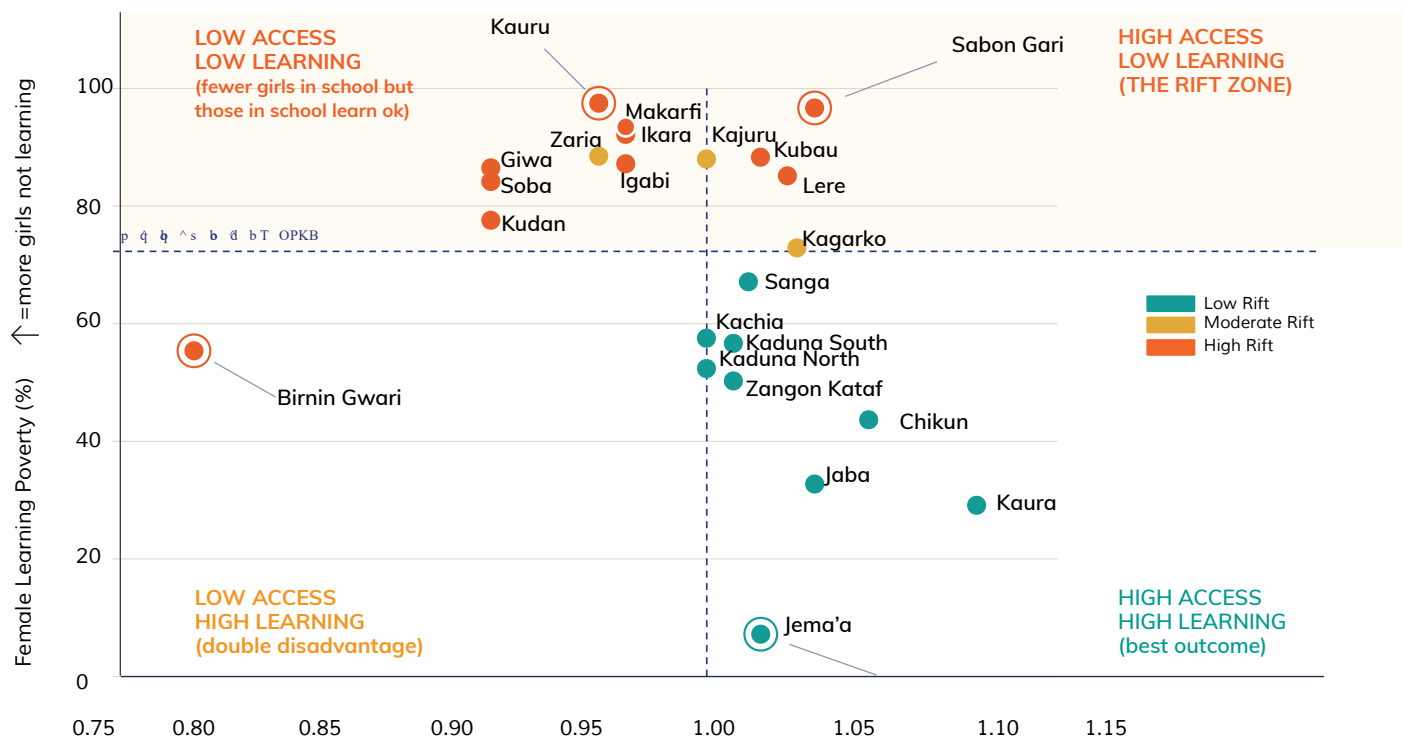


Figure 4: Gender Parity Index versus Female Learning Poverty. The upper-right zone illustrates high access alongside severe learning failure.

The access–learning map makes the rift particularly visible. Sabon Gari sits in the upper-right zone: GPI is 1.04, but Female LPI is 96.7%. Jema’a, Kaura and Jaba provide a contrasting within-state benchmark, combining relatively strong access with substantially lower learning poverty. The implication is not that GPI causes learning outcomes; rather, parity does not guarantee learning and must be interpreted alongside quality indicators.

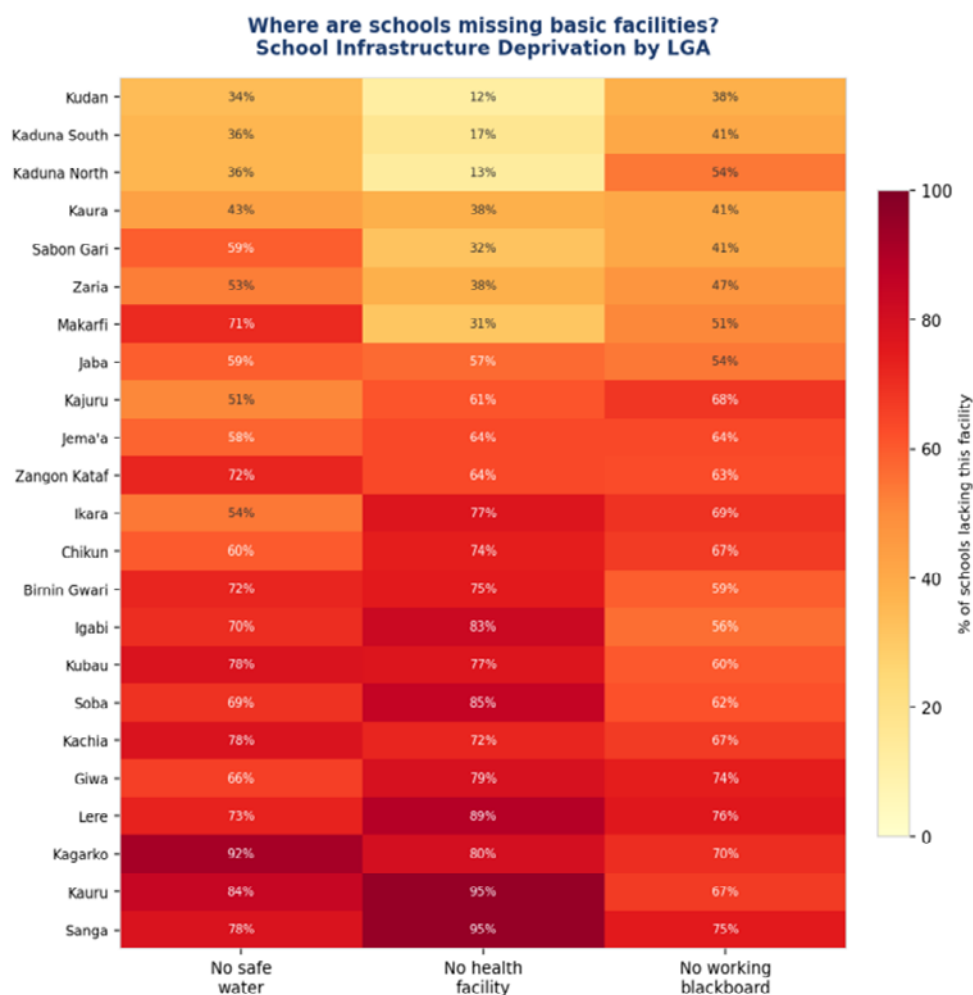


Figure 5: School infrastructure deprivation by LGA: percentage of schools lacking safe water, a health facility or a functional blackboard.

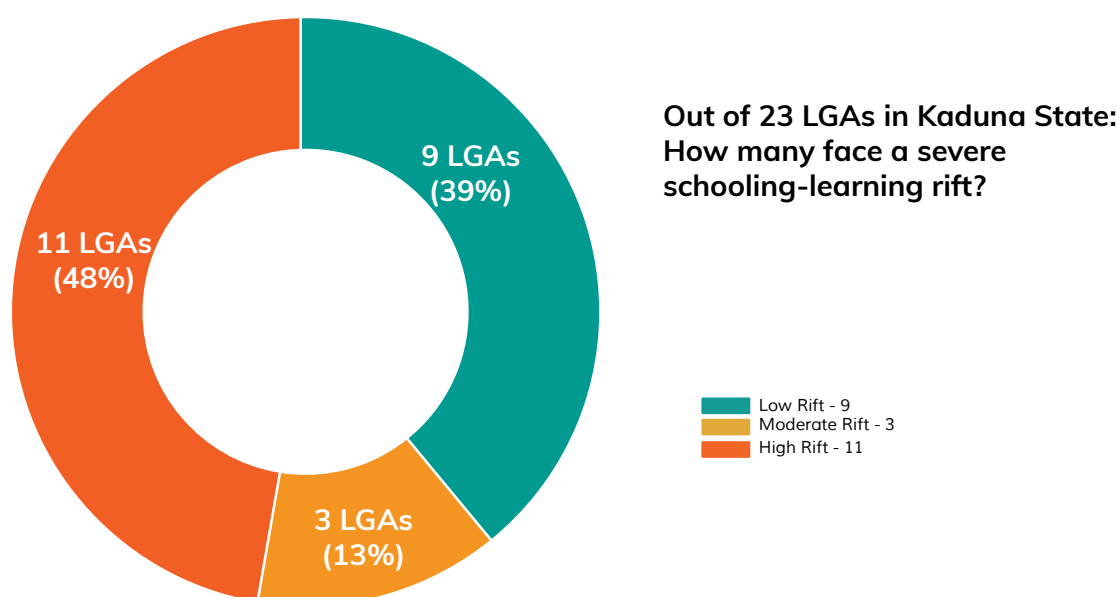


Figure 6: Distribution of Kaduna State's 23 LGAs by schooling-learning rift classification.

SECTION 5.4

Correlation Analysis

Predictor	r	Strength	Interpretation
Female OOSC (%)	+0.616	Strong positive	Higher female exclusion is associated with higher learning poverty.
Pupil–Teacher Ratio	+0.437	Moderate positive	Higher teacher congestion is associated with higher learning poverty.
Pupil–Classroom Ratio	+0.343	Moderate positive	Greater physical congestion is associated with higher learning poverty.
No Safe Water (%)	+0.272	Weak positive	Infrastructure deprivation is associated with higher learning poverty, but weakly in bivariate terms.
No Health Facility (%)	+0.150	Weak positive	A weak bivariate relationship may reflect indirect pathways through attendance and health.
No Functional Blackboard	+0.103	Negligible	Little bivariate variation is observed.
Gender Parity Index	–0.282	Weak negative	Parity alone is not a sufficient indicator of learning.

Female OOSC is the strongest bivariate correlate of learning poverty, followed by PTR and PCR. The weak negative association between GPI and LPI should not be interpreted as evidence that gender parity reduces learning poverty. It reflects the fact that high-parity LGAs span the full range of learning outcomes. Infrastructure variables show weaker bivariate relationships, likely in part because deprivation is relatively widespread across the state and because some effects operate through mediating mechanisms such as absenteeism.

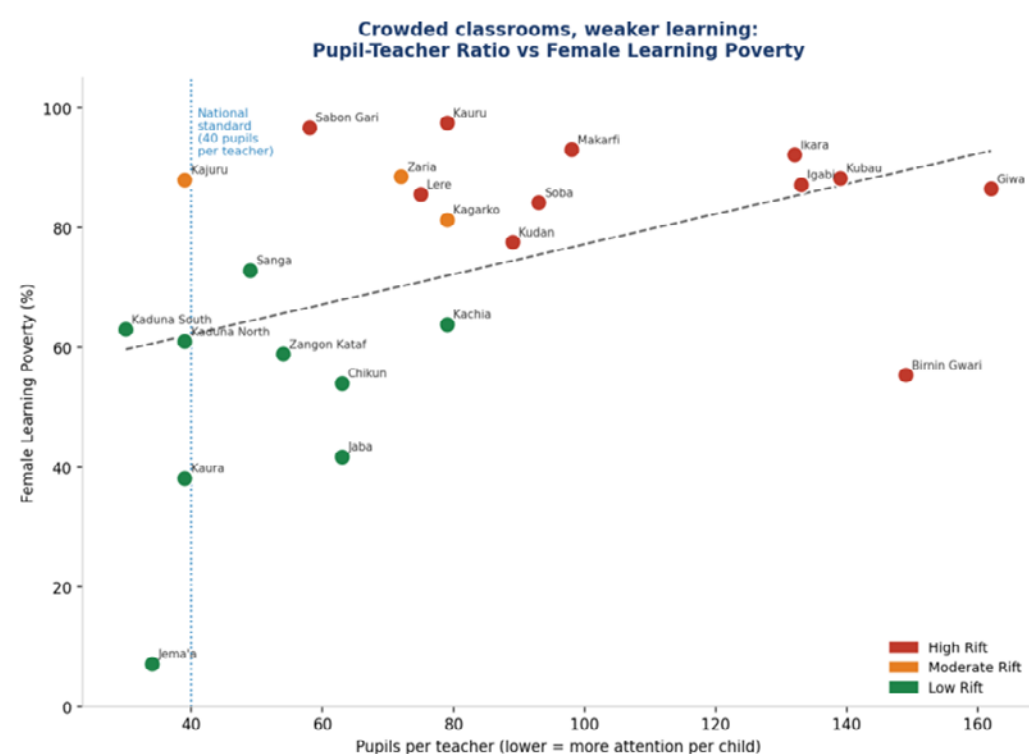


Figure 7: . Pupil–Teacher Ratio versus Female Learning Poverty, with the national 40:1 benchmark marked.

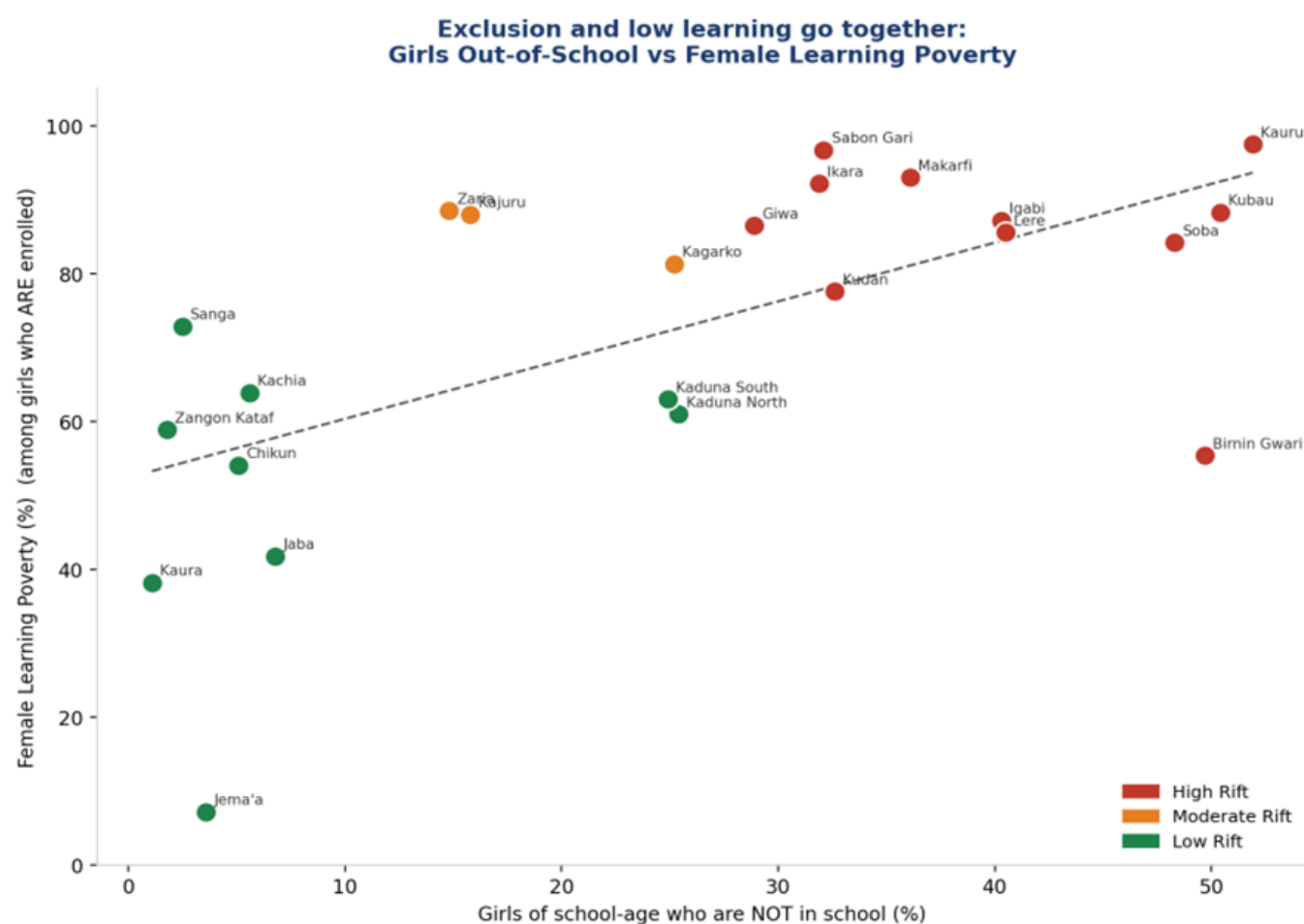


Figure 8: Female Out-of-School Children (%) versus Female Learning Poverty (%), by LGA.

SECTION 5.5

Beta Regression Results

The parsimonious model includes PTR, absence of a health facility and female OOSC. All three predictors are statistically significant and signed in the expected direction.

Variable	Direction	Significance	Average marginal effect	Interpretation
Pupil–Teacher Ratio	Positive	$p < 0.05$	+0.38 pp per unit	A 10-unit increase in PTR is associated with approximately +3.8 pp in LPI, holding other model variables constant.
No Health Facility (%)	Positive	$p < 0.05$	+0.22 pp per unit	Higher health-facility absence is associated with higher learning poverty.
Female OOSC (%)	Positive	$p < 0.01$	+0.51 pp per unit	The largest estimated association: higher exclusion is associated with higher learning poverty.

The model specification is $\text{lpi_sq} \sim \text{PTR} + \text{no_health_pct} + \text{female_oosc_pct}$, with a logit link and beta distribution. The dependent variable was transformed using the Smithson–Verkuilen adjustment. AIC favours the parsimonious model (–28.4) over the full five-predictor model (–24.1), and HC3 robust standard errors are used because of the small sample. The precision parameter exceeds 1, indicating concentration of the underlying proportions rather than a uniform distribution.

Female OOSC has the largest average marginal effect. A one-percentage-point increase in female OOSC is associated with a 0.51 percentage-point increase in Female LPI, conditional on the other predictors. PTR has the second-largest estimated association, while the health-facility variable has a smaller but statistically significant conditional association.

These marginal effects should not be interpreted as intervention impact estimates. For example, multiplying the PTR coefficient across a large hypothetical reduction from 150 to 40 pupils per teacher would be an extrapolation beyond the observed design and would ignore other constraints. The estimates are best used to identify the relative importance and targeting relevance of structural factors.

SECTION 6

Discussion

Interpreting the Rift Through the SES Framework

SES level	Variables/evidence	Interpretation
Microsystem / Mesosystem	Female OOSC; baseline learning gaps	Girls who are out of school or experience interrupted participation can enter later grades with cumulative learning deficits.
Exosystem	PTR; PCR; water; health; blackboards	Institutional capacity determines whether attendance can be converted into sustained, effective instruction.
Macrosystem	GPI; gender norms; female-teacher availability	Access norms can change faster than community investment in learning quality.
Chronosystem	Learning poverty data; budgets; teacher deployment; shocks	The system has diagnostic information, but policy response and investment may lag behind the evidence.

The findings broadly support the SES proposition that no single-level intervention is sufficient. Female OOSC is the strongest empirical correlate, but teacher supply and health infrastructure also remain significant in the multivariate model. This suggests that learning poverty emerges from interacting constraints rather than from a single deficit located in the learner.

SECTION 6.2

The Rift Paradox: Why Access Is Not Sufficient

The clearest illustration is the contrast between Sabon Gari and the better-performing access-and-learning LGAs. Sabon Gari has GPI above parity while 96.7% of enrolled girls are classified as learning poor. Jema'a, Kaura and Jaba demonstrate that strong access and better learning can coexist. The analytical conclusion is therefore not that access is unimportant, but that access must be complemented by measures of instructional quality and learning attainment.

This has direct implications for gender-equity measurement. A system can close the numerical gap in enrolment while leaving girls and boys without foundational skills. The paper therefore argues for a shift from an access-only accountability model towards a learning-centred model in which enrolment, retention, teacher supply, instructional quality and learning outcomes are considered together.

SECTION 6.3

Out-of-School Children and Cumulative Learning Deficits

The strength of the OOSC association is consistent with the cumulative nature of foundational learning. Reading and numeracy skills build sequentially; prolonged absence can interrupt the sequence and make later instruction less effective. The finding also has an important policy implication: re-enrolment programmes should not be evaluated only by whether girls return to school. They should include mechanisms for accelerated learning, assessment and instructional differentiation so that returning learners can recover foundational skills.

SECTION 6.4

Teacher Availability and Instructional Congestion

PTR is positively associated with learning poverty, supporting the proposition that teacher availability is an important institutional constraint. Yet the descriptive evidence also shows that PTR alone does not explain the pattern: some LGAs with relatively low PTR still have high learning poverty. This indicates that deployment reform should be coupled with instructional quality, structured pedagogy and teacher support rather than treated as a stand-alone solution.

SECTION 6.5

Infrastructure, Attendance and Learning Continuity

The weak bivariate correlations for water and health facilities do not justify deprioritising infrastructure. The health-facility variable becomes statistically significant in the multivariate model, consistent with the possibility that infrastructure operates through pathways not visible in simple correlations. For girls in particular, WASH and health conditions can affect attendance, safety, dignity and continuity. The policy lesson is to interpret infrastructure as part of the learning environment rather than as an isolated school-completion indicator.

SECTION 6.6

Comparison with Broader Nigerian Evidence

The finding that female OOSC is the strongest predictor is consistent with evidence that interrupted schooling compounds learning deficits. The significance of PTR aligns with Nigerian research describing persistent under-resourcing and weak instructional alignment. At the same time, the LGA-level analysis adds information that state-level averages cannot provide: two LGAs with similar enrolment parity can have radically different learning outcomes and therefore require different intervention mixes.

A NOTE ON INTERPRETATION

The findings establish patterned associations in the available administrative data. They do not establish that changing one predictor by a specified amount will mechanically produce a corresponding change in learning poverty. There may be omitted variables, reverse relationships, measurement error, and unobserved differences between LGAs. The policy recommendations should therefore be understood as evidence-guided priorities, not as causal effect sizes.

SECTION 07

Policy Implications and Programmatic Response

From Access Expansion to Learning Conversion

The analysis suggests that Kaduna’s next phase of education policy should focus on converting participation into learning. This requires differentiated targeting. High-rift LGAs with severe OOSC require both access and quality measures; high-rift LGAs with near-parity enrolment but severe learning poverty require a stronger quality and instructional focus; and low-rift LGAs can provide within-state benchmarks for effective practice.

SECTION 7.2

Priority LGA Profiles

Three LGAs illustrate the logic of differentiated targeting:

KAURU SLRI +2.16 Female LPI 97.5%, Female OOSC 51.9% 95% of schools without a health This is a compounded access-and-quality crisis requiring a dedicated LGA plan.	Sabon Gari SLRI + 0.84 Female LPI 96.7% GPI 1.04. The priority is instructional quality, structured pedagogy and classroom-level support rather than further enrolment expansion alone.	Birnin Gwari SLRI +1.50 Female OOSC 49.7% PTR 149:1. Both access and instructional capacity are constrained, requiring concurrent interventions.
---	--	---

SECTION 7.3

Evidence-Based Policy Package

#	Recommendation	Action	Lead actors	Timeline	Core monitoring indicator
1	Teacher deployment and retention	Target recruitment and retention support to LGAs with PTR >100; use rural-posting incentives and deployment planning.	State Ministry of Education; SUBEB	Short-term (1–2 years)	PTR in priority LGAs; teacher vacancy/retention rates.
2	WASH and health infrastructure	Prioritise safe water and health facilities in High-Rift LGAs, especially Kauru and Sanga.	Ministry of Works; LGA education authorities; WASH partners	Medium-term (2–4 years)	% schools with functional water and health facilities.
3	Structured pedagogy rollout	Adopt evidence-based structured literacy and numeracy programmes in highest-LPI LGAs, with coaching and formative assessment.	Kaduna SUBEB; education partners	Short-term (1–2 years)	Observed use of structured pedagogy; learner assessment trends.
4	OOSC re-enrolment and retention	Combine targeted conditional support, community engagement and accelerated learning for priority LGAs.	Social Investment Programme; UNICEF; community structures	Medium-term (2–3 years)	Female OOSC; re-enrolment; retention; recovery in foundational skills.
5	Annual LGA-level learning assessment	Institutionalise disaggregated learning data for evidence-based targeting and annual programme review.	Kaduna State Bureau of Statistics; education assessment authorities	Ongoing	Annual LGA learning profile and use of data in resource allocation.

SECTION 7.4

Implementation Sequencing

The recommendations should be sequenced rather than implemented as isolated projects:

Phase	Priority	Key outputs
Phase 1: 0–12 months	Diagnose and target	Validate LGA profiles; establish baseline; identify priority schools; finalise deployment and structured pedagogy plans.
Phase 2: 12–24 months	Implement core interventions	Deploy/retain teachers; roll out structured pedagogy; begin targeted OOSC support; initiate WASH/health improvements.
Phase 3: 24–36 months	Review and adapt	Compare annual learning data; reassess SLRI; adjust intervention mix by LGA.
Phase 4: 36+ months	Institutionalise	Embed LGA-level learning diagnostics and evidence-based allocation in routine planning and budgeting.

SECTION 7.5

Core Monitoring Indicators

Monitoring should distinguish between implementation, intermediate conditions and learning outcomes. The core indicators should include:

- ▶ **Access**
female OOSC rate, re-enrolment and retention in priority LGAs.
- ▶ **Teacher supply**
PTR, vacancies, deployment stability and retention.
- ▶ **Learning conditions**
water, health facilities, classroom congestion and basic teaching resources.
- ▶ **Instruction**
uptake of structured pedagogy and evidence from classroom observation/coaching.
- ▶ **Learning**
annual LGA-level literacy and numeracy outcomes, disaggregated by sex and where feasible by language/context.
- ▶ **Equity**
changes in the gap between High-Rift and Low-Rift LGAs over time.

SECTION 08

Limitations & Robustness

01 LGA Aggregation

The unit of analysis is the LGA, so the findings cannot identify variation between schools, wards or individual learners within an LGA. This is particularly important in large and heterogeneous LGAs. The SLRI should therefore be treated as a targeting diagnostic, followed by school-level assessment before programme design.

02 Small Sample Size

N = 23 places a strong constraint on model complexity. The parsimonious specification is therefore preferable to an overfitted model, but coefficient precision remains limited. Future analyses should test the relationships using school- or learner-level data where available.

03 Cross-Sectional Design and Causal Inference

The data are not longitudinal. It is therefore impossible to determine whether changes in OOSC, PTR, or infrastructure precede changes in learning poverty. Reverse relationships and omitted variables remain possible. The results should be interpreted as associations.

04 Measurement and Administrative Data Constraints

Administrative datasets can contain reporting inconsistencies, missing observations, and differences in measurement quality. The original correlation analysis includes a median imputation for the Kubau blackboard value. This is a pragmatic approach for descriptive completeness, but it introduces uncertainty and should be revisited if the source record can be verified.

05 SLRI Construction

The SLRI depends on standardisation and the chosen weighting of access indicators. The classification thresholds are diagnostic rather than externally validated. Future work should test sensitivity to alternative weights and thresholds before the index is institutionalised for funding decisions.

06 Model Specification

The beta regression specification is theoretically appropriate for bounded continuous proportions after the stated transformation, but the small sample means that results may be sensitive to influential observations. The paper therefore uses HC3 robust errors and AIC for parsimony, but does not claim definitive model selection.

07 Generalisability

Kaduna's results should not automatically be generalised to every Nigerian state. The value of the approach is its replicability: other states with comparable administrative datasets can construct their own LGA-level diagnostic and test whether the same structural relationships emerge.

WHERE THIS SHOULD GO NEXT

Future iterations should test alternative SLRI weights and thresholds, examine influential LGAs, compare alternative bounded-outcome specifications and where data permit, move from LGA level cross-sectional analysis to longitudinal school- or learner-level models. These steps would strengthen causal interpretation and improve targeting precision.

SECTION 9

Conclusion

The objective shifts: from measuring whether girls are **in school** to whether schooling is producing **learning**.

WHAT THE EVIDENCE ESTABLISHES

72.3%

Average Female Learning Poverty across the state

11 / 23

LGAs classified as High Rift

3

significant structural correlates: female OOSC, pupil–teacher ratio, absence of a health facility

FROM An access-only accountability model

Where enrolment and parity statistics stand in for equity.

TO A learning-centred model

Enrolment, retention, teacher supply, instructional quality and outcomes considered together.

A CAUTION

Teacher deployment without instructional reform, enrolment drives without learning recovery, or infrastructure without pedagogy is unlikely to close the rift alone.

Kaduna State has made measurable progress in girls' access to primary education, but access has not translated uniformly into foundational learning. With an average Female LPI of 72.3% and 11 of 23 LGAs classified as High Rift, the state faces a learning problem that cannot be adequately diagnosed through enrolment and gender-parity statistics alone. The central empirical finding is the coexistence of substantial access and severe learning poverty in some LGAs, Sabon Gari being the clearest example, with GPI 1.04 against Female LPI 96.7%. At the other end of the distribution, Jema'a, Kaura and Jaba show that stronger access and stronger learning can coexist. The rift is not a uniform state level condition; it is a geographically differentiated system problem.

The practical implication is a shift towards evidence-guided, LGA-specific allocation. The SLRI offers a low-cost mechanism for identifying where access gains have not translated into learning, and for sequencing the response accordingly. It is replicable in any state with comparable administrative data.

SECTION 09

References

- Abdu, M., Rabi, M., & Usman, A. (2020). Effect of child labour on children's education in Katsina State, Nigeria. *Mediterranean Journal of Social Sciences*, 11(1), 1–12.
- Adeniran, A., et al. (2025). Low-achieving equilibria: Instructional alignment and educational quality in Nigeria. RISE Programme Working Paper.
- Azubuike, O. B., Browne, W. J., & Leckie, G. (2024). State and wealth inequalities in foundational literacy and numeracy skills of secondary school-aged children in Nigeria: A multilevel analysis. *International Journal of Educational Development*, 104, 102942.
- Barnabas, B., et al. (2024). Access to food vs. education: Feeding the stomach is important for feeding the mind. Evidence from Nigeria. *Food Policy*, 122, 102582.
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Harvard University Press.
- Dogar, A., Shakeel, M. D., & Tooley, J. (2025). School choice and learning outcomes in two states in North Nigeria. *Journal of School Choice*, 19(2), 255–272. <https://doi.org/10.1080/15582159.2025.2492954>
- Dogar, I., & Shakeel, M. D. (2025). Foundational learning assessments under the ASER framework in Kaduna and Bauchi States. Unpublished working paper.
- Kaduna State Government. (2023). *Kaduna State Learning Poverty Report 2023*. Ministry of Education.
- Kaduna State Government. (2023). *Out-of-school children mapping report 2023*. Ministry of Education / UNICEF.
- Kaduna State Government. (2024). *Annual School Census 2024/2025*. State Universal Basic Education Board (SUBEB).
- Kaduna State Government. (2024). *Kaduna State Statistical Yearbook 2024*. Bureau of Statistics.
- Moliki-Salman, A., & Kopczak-Wirga, A. (2023). Gender-based violence and educational development of children in Northern Nigeria. *RAIS Journal for Social Sciences*, 7(1), 45–58.
- Ojuolape, A., & Mohd, N. (2024). Determinants of child schooling in Kwara State, North Central Nigeria. *International Journal of Education and Development*, 19(2), 112–128.
- Tong, L., & An, Y. (2024). Ecological systems theory in education research: A bibliometric analysis. *Frontiers in Psychology*, 15, 1358453.
- UNESCO. (2022). *Global education monitoring report 2022: Non-state actors in education*. UNESCO.
- UNESCO. (2023). *Global education monitoring report 2023*. UNESCO.
- UNICEF. (2022). *Where are we on education recovery?* UNICEF.
- UNICEF Nigeria. (2023). *Nigeria Education Fact Sheets 2023: Analyses for learning and equity using MICS data*. UNICEF Nigeria.
- UNICEF Nigeria. (2024). *Situation analysis of children and adolescents in Nigeria, 2024*. UNICEF Nigeria.
- UNICEF Nigeria. (2024). *From gender sensitivity to transformation: Nigeria's WASH GALA assessment (Kaduna and Adamawa States)*. UNICEF Nigeria.
- UNICEF Nigeria / National Bureau of Statistics. (2021). *Multiple Indicator Cluster Survey (MICS) 2021: Statistical snapshots*.
- Weber, A., Bogler, M., & Vollmer, S. (2024). Formal vs. informal mathematics: Assessing numeracy with school and market items in a large sample of school-aged children in North-West Nigeria. *Developmental Science*, 27(3), e13481.

- World Bank. (2020). The learning crisis: Ending learning poverty. World Bank Group.
- World Bank. (2022). Nigeria: Learning poverty brief. World Bank Group.
- Xiao, Y., et al. (2025). The social-ecological model applied to education outcomes: A scoping review. Educational Research Review, 44, 100610.

SECTION 09

Appendix A. Full LGA Dataset

LGA	Primary Total Enrolment	Male Enrolment	Female Enrolment	GPI	Female OOSC %	PTR	PCR	No Water %	No Health Facility %	No Good Blackboard %
Birnin Gwari	132,396	73,326	59,070	0.81	49.7	149	197	72	75	59
Chikun	78,497	38,088	40,409	1.06	5.1	63	85	60	74	67
Giwa	106,240	55,467	50,773	0.92	28.9	162	167	66	79	74
Igabi	213,013	107,924	105,089	0.97	40.3	133	151	70	83	56
Ikara	73,868	37,583	36,285	0.97	31.9	132	111	54	77	69
Jaba	38,821	19,018	19,803	1.04	6.8	63	65	59	57	54
Jema'a	35,888	17,731	18,157	1.02	3.6	34	44	58	64	64
Kachia	62,058	31,172	30,886	0.99	5.6	79	60	78	72	67
Kaduna North	32,733	16,437	16,296	0.99	25.4	39	103	36	13	54
Kaduna South	28,458	14,207	14,251	1.00	24.9	30	68	36	17	41
Kagarko	48,790	24,253	24,537	1.01	25.2	79	51	92	80	70
Kajuru	33,571	16,836	16,735	0.99	15.8	39	45	51	61	68
Kaura	53,969	25,733	28,236	1.10	1.1	39	70	43	38	41
Kauru	82,291	41,935	40,356	0.96	51.9	79	83	84	95	67
Kubau	108,466	53,913	54,553	1.01	50.4	139	68	78	77	34
Kudan	67,126	34,945	32,181	0.92	32.6	89	142	34	12	38
Lere	108,779	53,942	54,837	1.02	40.5	75	96	73	89	76
Makarfi	82,104	41,612	40,492	0.97	36.1	98	128	71	31	51
Sabon Gari	56,680	27,832	28,848	1.04	32.1	58	132	59	32	41
Sanga	35,501	17,751	17,750	1.00	2.5	49	44	78	95	75
Soba	80,187	41,698	38,489	0.92	48.3	93	100	69	85	62
Zangon Kataf	80,830	40,415	40,415	1.00	1.8	54	54	72	64	63
Zaria	110,633	56,423	54,210	0.96	14.8	72	134	53	38	47

Appendix B. Variable Definitions and Data Sources

Variable	Operational definition	Source
Female LPI	Share of enrolled Primary 6 girls below the minimum proficiency level in foundational literacy/ numeracy.	Kaduna State Learning Poverty Report (2023)
Female OOSC	Share of school-age girls out of school.	OOSC Mapping (2023)
GPI	Female-to-male enrolment ratio.	Kaduna Statistical Yearbook (2024)
PTR	Pupils per teacher.	Annual School Census (2024/25)
PCR	Pupils per classroom.	Annual School Census (2024/25)
No Safe Water	Share of schools without safe water.	Annual School Census (2024/25)
No Health Facility	Share of schools without a health facility.	Annual School Census (2024/25)
No Functional Blackboard	Share of schools without a functional blackboard.	Annual School Census (2024/25)
SLRI	Standardised difference between Female LPI and the composite access measure.	Author calculation from four datasets.

Appendix B. Variable Definitions and Data Sources

The SLRI combines standardised learning poverty with standardised access indicators. It is designed for relative comparison across the 23 LGAs rather than as an absolute measure of educational deprivation.

$$SLRI = \frac{z(\text{Female LPI}) - [z(\text{GPI}) + z(1 - \text{Female OOSC \%})]}{2}$$

SLRI range	Classification	Interpretation
> +0.75	High Rift	Learning poverty is substantially worse than access indicators would suggest.
−0.25 to +0.75	Moderate Rift	Learning and access conditions are more closely aligned or moderately divergent.
< −0.25	Low Rift	Learning outcomes are relatively better than access indicators would predict.

Appendix D. Model Specification and Technical Notes

The revised technical paper describes the model consistently with the implementation reported in the original draft: beta regression using the `betareg` package, logit link, Smithson–Verkuilen transformation for boundary values, HC3 robust standard errors, and average marginal effects. The original draft used the label “Fractional Logit (`betareg`)”; these are not synonymous model classes. If the underlying analysis code actually used a fractional-logit GLM rather than `betareg`, the model description and estimates should be reconciled before publication.

The parsimonious model was selected using theoretical considerations and AIC comparison with the full five-predictor specification. Given $N = 23$, the model should be interpreted cautiously. The primary analytical purpose is comparative targeting, not causal estimation.

Any Nigerian state holding a learning assessment, a school census, an OOSC mapping and an enrolment yearbook can construct this diagnostic. The inputs are already collected; what changes is how they are read against one another.